REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for indicating that claims 15 and 30 contain allowable subject matter.

I. Disposition of Claims

Claims 1-33 are pending in the present application. By way of the last reply entitled "Response to the Restriction Requirement," claims 1-11, 16-26, and 32 have been withdrawn from consideration. By way of this reply, claims 12 and 27 have been amended and claims 13, 15, 29, 30, and 33 have been cancelled without prejudice or disclaimer. Additionally, new claims 34-39 have been added.

II. Claim Amendments

Claim 12 has been amended to incorporate the limitations of claims 13 and 15. No new matter has been added by way of these amendments. Thus, claim 12 is now allowable. Claim 14, which depends from claim 12, is allowable for at least the same reasons.

Claim 27 has been amended to incorporate the limitations of claims 29 and 30. No new matter has been added by way of these amendments. Thus, claim 27 is now allowable. Claims 28 and 31, which depend from claim 27, are allowable for at least the same reasons.

III. Rejection(s) under 35 U.S.C § 102

Claims 12-14, 27-29, 31, and 33 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,805,878 issued to Rahman et al. (hereinafter "Rahman"). Claims 13, 15, 29, 30, and 33 have been cancelled in this reply. Claims 12 and 27 have been amended by way of this reply to incorporate allowable subject matter as discussed above. Thus, claims 12, 14, 27, 28, and 31 are now allowable. Accordingly, withdrawal of the §102 rejections is respectfully requested.

IV. New Claims

New claims 34-39 have been added to the present application. No new matter has been added by way of these amendments as support for these amendments may be found, for example, in Figure 4 of the present application.

The present invention relates to a method of improving branch prediction accuracy. With reference to an exemplary embodiment of the present invention shown in Figure 4 of the present application, after an instruction is decoded by an instruction fetch unit (step 72), a decision is made as to whether the instruction is a branch instruction (step 74). If the instruction is not a branch instruction, the next instruction is read and decoded (step 80). If the instruction is a branch instruction, a second decision is made as to whether the branch instruction has been read in a prior cycle (step 76). If the branch instruction has not been read before, the current fetch bundle address is used to index a branch prediction structure (step 79). If the branch instruction has been read before, the instruction fetch unit must determine the proper fetch bundle address for the branch instruction (step 78). In other words, if the branch instruction has been read before, a

fetch bundle address is used that corresponds to when the branch instruction was read as part of a prior instruction fetch bundle.

With reference to an exemplary embodiment of the present invention shown in Figure 5 of the present application, if a misprediction occurs for the branch instruction at B+2 (84), then the next branch instruction occurring at B+7 (88) uses B (82) as its index. Thus, although the initial misprediction causes the instruction fetch unit to fetch a new bundle of instructions with a new fetch bundle address, i.e., B+3 (86), the instruction that initially occurred at B+7 (88) still uses B (82) as its index.

As explained with reference to Figures 4 and 5 of the present application, the present invention requires that a branch instruction may be recognized as an instruction that was previously removed as a result of a misprediction. Thereafter, the branch predictor makes a prediction for the recognized branch instruction using the assigned address for the recognized branch instruction from the removed set of instructions. These limitations were required by dependent claims 15 and 30 of the present application, which have been incorporated into respective independent claims 12 and 27. New claims 34, 36, and 38 have similar limitations. Specifically, for example, in independent claim 34, a determination is made as to whether a branch instruction in the current set of instructions was read prior to being received, and if the branch instruction was read previously, a prediction of an outcome for the branch instruction is made using an address from a previous set of instructions in which the branch instruction was read.
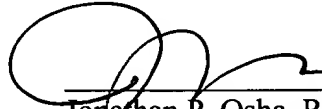
Rahman, by contrast, fails to show at least the limitations recited in independent claims 12, 27, 34, 36, and 38 of the present invention. Rahman states that a method is provided by which predictions for multiple branch instructions indexed as a group may

be outputted in a correctly ordered and synchronized manner for merging with appropriate branch instructions in the instruction buffer (col. 9, lines 50-56). Rahman is silent with respect to retaining the assigned address for a branch instruction such that, if the branch instruction is read again, a prediction is made based on the previously assigned address. Thus, claims 34, 36, and 38 of the present application are patentable over Rahman. Dependent claims are allowable for at least the same reasons.

V. Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places the present application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 03226/047001; P4272).

Respectfully submitted,

Date: <u>October 13, 2004</u>

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15